

## **QPF Process Implementation Working Group (IWG)**

### **Meeting 1 Summary**

**Nov 30 - Dec 1, 1999**

**NWSH, Silver Spring , MD**

**QPF Process IWG Goal:** Complete tasks specified in the Corporate Board-approved QPF Implementation Time Line to ensure implementation by 30 September 2000 of the recommendations adopted at the August 1999 Director's Conference and the supporting recommendations outlined in the QPF Process Assessment Team Report.

**Purpose of Meeting 1:** Provide a forum to discuss and resolve issues and plan activities which support completing the QPF Implementation Time Line Tasks (reference the Corporate Board-approved Implementation Time Line disseminated by OM on 12 November)

**Goals of Meeting 1:** Resolve issues and complete tasks with near-term deadlines, and establish strategy/plan to resolve remaining issues to ensure implementation of Corporate Board-approved modified QPF process by 30 September 2000

**The QPF Process IWG successfully achieved their meeting goals.**

#### **IWG Members:**

CR - Bob Wavrin, Noreen Schwein  
ER - Peter Gabrielsen, Mark Fenbers  
SR - Ben Weiger, Bill Lawrence  
WR - Steve Hughes, Chris Hill<sup>1</sup>  
NCEP - Dave Reynolds  
OH - Bill Wilson  
APO/OSD - Dave Ruth  
OSO - Lloyd Irvin  
OM - Tom Graziano<sup>2</sup>, Brett McDonald, Michael Mercer, Dave Helms

<sup>1</sup>unable to attend Meeting 1

<sup>2</sup>IWG coordinator

## **List of Discussion Topics/Implementation Issues and Related Actions**

*New Actions are Depicted in Redline*

### **1.) Reviewed Primary IWG Goal**

- Implement Modified QPF Process by 30 Sep 2000
- Milestone/Performance Measure in NWS FY00 Operating Plan

### **2.) Conducted IWG Orientation**

- Implementation of modified QPF process is a top priority NWS milestone
- Opportunity for service improvement
- Significant challenge and cultural change
- Team effort for “common good”
- Cooperation and timely support of IWG is critical for success
- Corporate Board members unanimously approved implementation of a modified and streamlined QPF process (east of Continental Divide) and the framework and decision process for the WR Follow-on Assessment
- IWG members are envoys (at meetings) for their Directors and focal points for QPF implementation activities
- IWG membership includes personnel with operational experience/knowledge of QPF process
- PQPF outside scope of this implementation

### **3.) Established IWG Ground Rules**

- Directors share responsibility for ensuring on-time and effective implementation
- Action Office/Region responsible for task completion
- IWG members will lead and coordinate progress toward successful completion of Time Line tasks within their Office/Region
- Tasks/decisions with multiple Action Office(s)/Region(s) require consensus
- One vote per Office/Region for consensus decisions
- OM (Graziano) is coordinator/facilitator and Time Line monitor
- Bi-weekly updates provided to NWS Director during Tue/Thu Staff Meetings (Mandt)
- Must complete all tasks on or before approved deadlines
- Failure is not an option

### **4.) Summarized Recent QPF Activities**

#### *QPF Assessment*

- Director Kelly met with QPF Process Assessment Team (PAT) on Feb 25, 1999
- QPF PAT (Carter) briefed Director Kelly on June 18, 1999
- Final QPF PAT Report delivered to Director Kelly on July 23, 1999
- Corporate Board unanimously adopted the QPF PAT Recommendations 25 Aug 1999

#### *QPF Implementation*

- Corporate Board unanimously adopted the QPF Implementation Time Line on 10 Nov 1999
- QPF Process IWG convened 30 Nov 1999

#### **5.) Reviewed recommendations adopted at the August 1999 Director's Conference**

- HPC and HAS personnel will produce QPF products for use in river forecast models for all RFCs east of the Continental Divide
- HPC and HAS QPF products will be distributed to external NWS customers and partners
- All WFOs may, if they have a local requirement, produce QPFs for internal and external local use
- QPF production process in the Western Region (west of the Continental Divide) will be reevaluated after the 1999-2000 wet season

#### **6.) Reviewed supporting recommendations outlined in the QPF Process Assessment Team Briefing (Carter - June 18 & August 25) and Final Report**

##### *Mobilize Existing HPC Resources to Support NWSRFS*

- Produce QPF products for direct use by HAS
- Provide 1200 and 0000 UTC forecast cycle guidance at 6-h resolution through Day 2
- Provide Day 3 guidance
- Delineate areas of measurable precipitation
- Coordinate with HAS and fulfill requests for QPF updates
- Provide HPC forecasters with training on NWSRFS

##### *Empower HAS Function*

- Enhance HPC guidance
- Routinely coordinate with HPC
- Assume responsibility for QPF product and updates for at least the first 6 h
- Coordinate with WFOs prior to and during flooding situations
- Provide QPF guidance to WFOs
- Transmit ground truth and HAS QPF products in a consistent format to the NPVU
- Provide additional training for RFC staff

##### *Introduce Enhancements and Standardization*

- Satisfy existing requirements for a consistent and more effective AWIPS QPF tool in Build 5
- Implement nationally-approved QPF verification program
- Ensure consistent data archival, transmission format, and facilitate data access
- Encourage more uniform operational policies

*Promote Hydrometeorology at the WFO*

- Focus on short-term heavy precipitation and critical flash flood services
- Ensure skillful use of WHFS/SCAN
- Fulfill baseline proficiency standards and meet NWS performance goals
- Emphasize interaction with RFCs and outreach with emergency managers and hydrologic user community

**7.) Reviewed Corporate Board QPF Implementation Time Line and Tasks**

- Completion of specified tasks will ensure implementation by 30 September 2000 of
  - ✓ the recommendations adopted at the August 1999 Director's Conference, and
  - ✓ the supporting recommendations outlined in the QPF Process Assessment Team Report
- Ensured all IWG members understood specific tasks and the relationship of each task to the overall implementation activity
- OM/Graziano will update QPF Implementation Time Line with additional and necessary tasks agreed to by QPF Process IWG during meeting 1 (and included in this summary) NLT 22 December 1999.
- It was agreed that there is a lack of QPF Implementation Time Line tasks which support the implementation of the modified QPF process west of the Continental Divide (WR/Hughes agreed to develop these additional tasks NLT Feb 4, 2000. These tasks will only be needed if the Corporate Board agrees to implement a modified process in WR -- a decision which will be based on results of the ongoing follow-on assessment).

**8.) Made RFC QPF Software Decision (for 9 CONUS RFCs East of the Continental Divide)**

- Implementation Time Line Task – December 2: Reach consensus on standard RFC software application and format for HPC-generated QPF grids. Action: ER/CR/SR/OH
- Reviewed/Demonstrated Software Options
  - ✓ HASQPF
  - ✓ AWIPS (GFE/GMOD)
  - ✓ N-AWIPS (NMAP)
  - ✓ Other
- Software application selected will be used at RFCs east of Continental Divide until uniform (HPC, RFC, WFO) prototype tool is delivered via AWIPS (Build 5.2)
- Discussed pros, cons, including implementation issues (RFC integration, training, maintenance)
- WR will continue to use WR-developed and supported Mountain Mapper (or

- other) application
- **N-AWIPS (NMAP) was the unanimous software selection**
- CR, ER, and SR agreed to use RFC GeoData binary basin boundaries
- Advantages of implementing NMAP as a local application at RFCs east of Continental Divide
  - ✓ NMAP is most resource-efficient means of meeting the critical RFC software needs for QPF process implementation
  - ✓ NMAP nationally-supported by NCEP/NCO
  - ✓ Functionality of the product generation component of NMAP exceeds functionality of currently utilized HASQPF application (which is not nationally supported)
  - ✓ Consistency with HPC software product format (VGF format)
  - ✓ Can directly initialize editor/product generation tool with HPC guidance
  - ✓ Final RFC QPF (VGF/grid) viewable at HPC for coordination
  - ✓ NCEP/NCO has developed RedBook graphics driver and utility to generate standard WMO/NWS GRIB bulletins
  - ✓ The full functionality of the NMAP tool as an AWIPS local application is planned for late FY00 (NCEP/NCO plans translator to read AWIPS NETCDF files)

**9.) Established tasks required for implementation of NMAP at the nine RFCs east of Continental Divide**

1. Draft OM memo on behalf of QPF Process IWG to NCEP Director and APO Director stating
  - ✓ NMAP was selected for use at RFCs (request product generation component, support/maintenance, and training).
  - ✓ RFCs will also need full installation of GEMPAK executables for GIF generation and grid post-processing
  - ✓ Need approval from APO to install NMAP as a local application on AWIPS at RFCs
  - ✓ Request provision of test version of NMAP software delivered to ABRFC by January 5, 2000
  - ✓ RFCs agree to run NCEP version of software without local modification
  - ✓ RFC requests for software modifications will be coordinated through HPC
  - ✓ Bill Lawrence (ABRFC DOH) will serve as RFC focal point (with NCEP-NCO) on behalf of OH, for RFC integration
  - ✓ Request response by Wednesday Dec 15<sup>th</sup>.
  - ✓ **Complete memo by noon Wednesday, Dec 8<sup>th</sup>. Action: Graziano/OM. [Deadline met. Mandt memo was disseminated Dec 8]**
2. **Coordinate preliminary NMAP implementation activities (i.e., let staffs know what to expect and when to expect it) with RFC HICs and staffs. (Complete by January 5, 2000. Action: CRH/Schwein, ERH/Gabrielsen, SRH/Weiger in**

coordination with Bill Lawrence)

3. The ABRFC DOH, on behalf of OH and empowered by the QPF Process IWG, will develop scripts which support the integration of NMAP with NWSRFS at each RFC east of the Continental Divide. (Complete by January 31, 2000. Action: Lawrence/ABRFC). Scripts will be developed to output RFC QPF in the following formats:
  - ▶ XMRG (4 km HRAP grid for RFC internal applications/NWSRFS)
  - ▶ VGF (for coordination with HPC)
  - ▶ GRIB (10 km AWIPS 218 grid initially for display on WFO AWIPS and use by NPVU – in time will be used to initialize GFE at WFOs)
  - ▶ GIF (it was agreed that *all* RFCs will post the QPF which was used in NWSRFS on their respective Home Pages)

*Note:* APO has a 30 March 2000 action on Corporate Board QPF Implementation Time Line to develop a patch which will enable WFOs to display the RFC grid on AWIPS (i.e., convert GRIB to NETCDF and display via D2D volume browser). Based upon IWG discussions, this grid will be the 10 km AWIPS 218 grid which will also be used to initialize GFE after APO develops a post-Build 5.0 patch which will enable GFE to be initialized with either the RFC or HPC [10 km AWIPS 218] grid.

Determine whether HRAP grid can be displayed in D2D on WFO AWIPS.  
Action: Ruth/APO -- NLT 6 January 2000.

Submit a request to the DRG to obtain WMO headers for RFC QPFs in NMAP VGF format (so that these QPFs can be transmitted to HPC for coordination), and GRIB-encoded RFC QPFs for use at WFOs and the NPVU. Action: Wilson/OH – NLT 14 January 2000.

4. Establish training plan/time line for 9 affected RFCs. Assess whether additional resources are required and if so submit as part of FY00 and FY01 resource assessment due to CFO by 23 December 1999. Training options include: a.) Conduct training at NCEP, b.) NCEP conducts training at each RFC. (Complete training plan by January 31, 2000. Action: NCEP/Reynolds and OM/Graziano)
5. Demonstrate NMAP at one RFC from each region (SR, ER, CR). These RFCs were designated as ABRFC, NERFC, and NCRFC. (Complete by March 30, 2000. Action: OH/Wilson, SR/Lawrence, ER/Gabrielsen, CR/Schwein)
6. Conduct RFC NMAP training. (Complete by May 1, 2000. Action: NCEP/Reynolds, OM/Graziano, SR/Weiger, ER/Gabrielsen, CR/Schwein)
7. Implement fully functional NMAP and associated post-processing scripts at the six additional RFCs east of the Continental Divide -- OHRFC, MARFC,

WGRFC, LMRFC, SERFC, and MBRFC. (Complete by May 1, 2000. Action: OH/Wilson, SR/Lawrence, ER/Gabrielsen, CR/Schwein)

#### 10.) Discussed WFO QPF Software Options/Issues

##### *Pre-Implementation of Modified QPF Process*

- WFOs east of the Continental Divide will use either GMOD or WinQPF to support their associated RFCs
- ER/Gabrielsen, CR/Schwein, and SR/Weiger agreed to provide Ruth/APO a prioritized list of WFOs which plan to transition to GMOD for QPF generation prior to Build 5.0/GFE implementation (NLT 15 Dec 1999). Regions will coordinate with RFCs/MSM to determine if basins used by APO to generate HSA grid masks are current/correct. If no additional WFOs plan to use GMOD, regional representatives will still provide email stating this by the above date.
- ER/Gabrielsen, CR/Schwein, and SR/Weiger stated that each of their regions has developed approaches to transmit WinQPF grids from the WFOs to RFCs without using AFOS and guaranteed that this/these "AFOS free" solution(s) will be implemented and operational prior to the AWIPS commissioning dates for each of their offices.

##### *Post-Implementation of Modified QPF Process*

- AWIPS/GFE will be standard grid editing tool utilized by WFOs east of the Continental Divide (replacing AWIPS/GMOD and WinQPF)
- WR will continue to use and support Mountain Mapper until a uniform AWIPS solution is developed, tested, and implemented (as reflected in QPF implementation Time Line tasks)
- Additional APO task should be added to the QPF Implementation Time Line: Implement patch (sometime after Build 5.0 and before Build 5.1) which will enable WFO forecasters to initialize GFE with either the gridded RFC or HPC QPF
  - ✓ Will enhance coordination between RFC/HPC and WFO products (particularly at WFOs which are supported by multiple RFCs)
  - ✓ Will increase efficiency of QPF process
- When a uniform national AWIPS application is developed, tested, and implemented it will be used by all WFOs
  - ✓ Prototype tool developed by Build 5.2
  - ✓ Will support HPC, RFCs, and WFOs
  - ✓ Based on Sep 1997 AWIPS QPF Requirements Mtg at CBRFC
  - ✓ Requirements documented in NWS QPI Plan and on AWIPS Build 5 Home Page (RWP00059)
  - ✓ QPF requirements recently mapped by APO (Seguin) into Build 5 Plan

#### 11.) Discussed Modified QPF Process NWS Product/Data Flow

*HPC*

- ✓ Produce continuous 6-h QPF for 00 and 12 UTC forecast cycles
- ✓ Utilize NMAP software
- ✓ Utilize model grids, MOS, radar, satellite, surface data, previous HPC forecast guidance
- ✓ Output formats [RedBook Graphic (RBG), points (SHEF for WR), grids, VGF for initialization of NMAP at RFCs]

*RFCs (West of Continental Divide, if modified process implemented)*

- ✓ Modify Model, HPC, or other (point) QPF through at least 6-h
- ✓ Utilize Mountain Mapper or other (NWRFC) software
- ✓ WRH provides SHEF-encoded point RHEA, NOGAPS, etc. guidance
- ✓ Points converted to FMAPs for input to NWSRFS
- ✓ Provide point QPF to associated WFOs and QPS/graphics to partners and customers

*RFCs (East of the Continental Divide)*

- ✓ Modify HPC QPF through at least 6-h
- ✓ Utilize NMAP software
- ✓ Grid output converted to FMAPs for input to NWSRFS
- ✓ Provide grid to associated WFOs for display via AWIPS and QPS/graphics to partners, and customers

*All RFCs will provide QPFs and Stage III (or equivalent) QPE in a consistent format to the NPVU*

*WFOs (East of Continental Divide)*

- ✓ View RFC and HPC graphics/grids
- ✓ Use AWIPS/GFE software to create grid
- ✓ Convert grid to QPS and/or graphic and provide to users
- ✓ Provide gridded QPF (when generated) to the NPVU for verification

*WFOs (West of Continental Divide, if modified process implemented)*

- ✓ Modify RFC or HPC point QPFs using Mountain Mapper or other software
- ✓ Convert points to QPS and/or graphic/grid and provide to users
- ✓ Provide point QPFs (when generated) to the NPVU for verification

**12.) Agreed on a standard format for the short-term archival/transmission of RFC QPE (Stage III/RFCWide or equivalent [e.g., Mountain Mapper]) and HAS-modified HRAP-gridded QPF grids**

- Necessary to support generation of NCEP/EMC Stage IV analysis (for model initialization) and for the implementation of the NPVU
- Consistent format improves service to partners/customers

- Format agreed to was standard WMO/NWS GRIB bulletin
- SR/Lawrence and OH/Wilson will ensure scripts to post-process NMAP prepared QPFs are output in GRIB (and other formats)
- OH/Wilson will investigate the feasibility (including resource implications) of effecting a transition from the use of XMRG as the standard grid format for internal RFC use to GRIB format (notify QPF Process IWG NLT January 27, 2000)
- In addition to the hourly Stage III or equivalent (e.g., Mountain Mapper) QPEs generated and transmitted in near real-time, generate HAS function quality-controlled 6- and 24-h Stage III or equivalent products at each CONUS RFC and transmit in GRIB format to the NPVU NLT valid time plus 24 hours. (Action: Wilson/OH will confirm that WMO headers are available for hourly Stage III or equivalent grids and submit request to DRG to obtain WMO headers for the 6- and 24-h QPE grids NLT January 14, 2000)
- Generate Mountain Mapper 6- and 24-h gridded QPEs at each RFC and transmit to NCEP and NPVU in GRIB format. Action: Hughes/WR – NLT 1 May 2000.
- Assess resources required to satisfy requirement for 1-h GRIB-encoded Mountain Mapper (or Stage III) QPEs in near real-time. Action: Hughes/WR – NLT 1 February 2000.
- Provide GRIB encoding software to the RFCs NLT 15 February 2000. Action: Wilson/OH

### **13.) Reviewed HPC Product Suite and Service Enhancements**

- Discussed Phase 1 and Phase 2 product suite enhancements (for specific product changes see product schedules attached to the Corporate Board QPF Implementation Time Line)
- Several new/enhanced products
- As of 1200 UTC 6 December 1999, HPC now produces continuous QPF products for both the 1200 and 0000 UTC forecast cycles
- Impact: only product which was discontinued was the HPC Air Stagnation Product
- HPC FTE neutral

### **14.) Reviewed framework and decision process for the WR Follow-on Assessment**

- QPF Process Assessment Team will review verification results and provide recommendation to Corporate Board on May 17, 2000 (see QPF Implementation Time Line tasks)
- Includes both CNRFC and NWRFC
- Details of the framework and decision process are specified in attachment to Corporate Board QPF Implementation Time Line

### **15.) Developed outline for June-July 2000 Operational Test and Evaluation**

- Primary goal/objective - Demonstrate modified QPF Process East of the Continental Divide

- Implement by RFC - Developed priority order for all 9 RFCs
- **Once operational capability is demonstrated, WFOs will be relieved of their responsibility for generating QPF for input to NWSRFS**
- WFOs need capability to at least view HPC & RFC 6 hour QPFs on D2D [requires patch (es) which is (are) listed in QPF Implementation Time Line]
- RFC prioritization – **three-phased implementation with each phase separated by no more than 3 weeks**
  - ✓ Phase one: ABRFC, NERFC, NCRFC (implementation NLT 1 June 2000)
  - ✓ Phase two: WGRFC, MBRFC, OHFRC (implementation NLT 22 June 2000)
  - ✓ Phase three: MARFC, LMRFC, SERFC (implementation NLT 13 July 2000)
- Test and validate coordination procedures
- Test and validate HPC and RFC backup procedures

#### 16.) Discussed HPC Product Updates

- Problem with the Red Book Graphic (RBG) decoder in AWIPS
  - ✓ Decoder does not allow the HPC to correct or amend their RBG products
  - ✓ **Request that fix be checked into the next available patch going out to the field after January 15, 2000 (Complete by 17 December 1999. Action: Helms/OM)**
  - ✓ Detailed description of problem: The RBG decoder assumes that products not sent during routine delivery times are segments of existing products already ingested. This results in RBG products sent with the same WMO headers but issued at nonscheduled times (such as corrected and amended products) being deleted and not available to users. After NCEP/NCO stops sending segmented products on January 15, 2000, the segmentation logic in the RBG decoder that causes corrections and amendments to be deleted can be removed from AWIPS. There after, AWIPS RBG decoder software can presume that each unique RBG WMO header received is a unique product.
- Satisfying RFC requests for HPC product updates
  - ✓ HPC proposed further modifying their Phase 2 product suite schedule (see attachment to QPF Implementation Time Line) to include the issuance of the four 6-h QPFs aggregated to generate the preliminary Day 1 and Day 2 24-h QPFs. These 6-h QPFs would be issued for both the 1200 and 0000 UTC forecast packages. The additional 6-h Day 1 QPFs would be issued at 0615 and 1815 UTC and the additional 6-h Day 2 QPFs would be issued at 0700 and 1900 UTC.
  - ✓ It was agreed that the provision of 6-h QPFs through Day 2 four times per day should yield a QPF issuance frequency sufficient to avoid other requests for updates from individual RFCs.

#### 17.) Discussed HPC Backup Procedures

- Plans currently being developed
- Short-term Backup
  - ✓ Previous HPC guidance
  - ✓ Model Guidance
  - ✓ HAS function
- Long-term backup
  - ✓ Potentially move operation to NWSH
  - ✓ HPC will examine feasibility of using AWIPS/N-AWIPS workstations on 14<sup>th</sup> floor of SSMC2

#### 18.) Discussed of HPC-RFC-WFO QPF Coordination

- Further discussion/planning required
- With the new QPF process, QPF products from the HPC, RFC, and WFO (where issued) would be issued to partners/customers. WFOs will be local focal point and responsible for articulating to customers/partners differences in RFC and WFO QPF (should they exist).
- HPC-RFC Coordination
  - ✓ All agreed that RFC-HPC coordination should be event driven and not required daily
  - ✓ HPC will utilize point-to-multipoint “blast-up” teleconferencing
  - ✓ Define a regular time for coordination calls (e.g. 1500 UTC, 2100 UTC, 0300 UTC, and 0900 UTC) when coordination is needed. Action: Each regional representative to query their respective RFCs and provide feedback on these proposed times by 14 January 2000.
  - ✓ Add HPC as an addressee on HCM and HMD messages NLT 28 January 2000 (Action: CONUS Regions)
- HPC-WFO Coordination
  - ✓ HPC will continue to be receptive to calls from WFOs
  - ✓ WFOs should review preliminary Day 1 and 2 QPFs before issuing zones as these products will serve as basis for QPF input to NWSRFS
- RFC-WFO Coordination
  - ✓ QPF from a WFO using ICWF/IFPS is automatically issued in the tabular Revised Digital Forecast (RDF) product [OSD is examining giving WFOs the option of including snow amount or QPF]
  - ✓ QPF is not used in the zone formatter (heavy rain is keyed by precipitation intensity [e.g., R+] not the amount)
  - ✓ MICs are concerned about how coordination will take place in the new QPF process
  - ✓ Need to examine whether RFCs should produce a seamless national QPF and if so how this product would be coordinated/produced.
  - ✓ Need to examine whether RFCs should utilize point-to-multipoint “blast-up” teleconferencing to coordinate with WFOs
    - ▶ Routinely utilized in WR
    - ▶ Review WR costs to assess cost of implementing east of

Continental Divide and include, if necessary in FY00 and FY01 resource assessment to CFO due 23 Dec [Complete by 15 Dec 2000. Action: Hughes/WR -- Deadline met]

**19.) Discussed Plans to Meet QPE, QPF, and Flash Flood Training Requirements**

- Two new courses designed to meet training needs
  - ✓ Heavy Rainfall/Flash Flood Symposia
    - ▶ Train-the-Trainer course targeted at SOOs
    - ▶ Contingent upon FY00 final allocation
    - ▶ 5-day COMET residence course
    - ▶ Companion web-based training materials
    - ▶ First course late FY00 (August and September)
    - ▶ Included in FRG NSTEP FY00 Implementation
  - ✓ RFC/HPC QPI Course
    - ▶ Designed to ensure RFC HAS and HPC Forecasters meet the demands of the modified process
    - ▶ 6-day COMET residence course
    - ▶ Companion web-based training materials
    - ▶ First course early FY01
    - ▶ Included in FRG Draft NSTEP FY01 Implementation Plan (reprogram existing training funds)
- Support implementation of the modified QPF process as directed by the NWS Corporate Board

**20.) Established Team Coordination Procedures**

- IWG coordinator will send out weekly email updates by COB each Friday (Action: OM/Graziano)
- Conduct conference calls at least once per month beginning 21 December 2000 at 1000 ET (Action: IWG)
- Conference calls will be scheduled by Mercer/OM
- Conference call agendas will be developed by IWG Coordinator (Action: Graziano/OM)
- Distribute schedule for monthly calls NLT 7 January 2000. (Action: Graziano/OM)
- Conduct at least one more “face-to-face” meeting. Action: OM/Graziano [This meeting is currently scheduled for noon March 28 to noon March 30, 2000 to support final preparations for the OT&E]